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On a putative Gondwanan relic *Afroserphus bicornis* Masner (Hymenoptera: Proctotrupidae), with a description of the hitherto unknown female

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ABSTRACT

The male of *Afroserphus bicornis* Masner is redescribed, and female of this species is described for the first time. This extremely rare species is recorded from the Democratic Republic of Congo, Uganda, Zambia, and South Africa. The genus *Afroserphus* is hypothesised to be a Gondwanan relic.

KEY WORDS: Hymenoptera, Proctotrupidae, *Afroserphus*, parasitic wasps, Afrotropical, South Africa, Gondwana, endemic.

INTRODUCTION

The proctotrupid wasp fauna of sub-Saharan Africa is very poor and includes only two genera. Nine species of the cosmopolitic genus *Exallonyx* Kieffer, 1904 are found in the afrotropics, and four of them have been recorded from South Africa (Kolyada *et al*. 2004). The genus *Afroserphus* Masner, 1961 was established to accommodate the only species, *A. bicornis*, described on the basis of a single male from the Democratic Republic of Congo (then Belgian Congo, or Zaïre). This is an unusually rare proctotrupid, with a handful of specimens having been collected since its first discovery. It seems to occur over the Eastern Arc countries, reaching South Africa in its southernmost range of distribution. Having seen a female from Entebbe, Uganda, Townes (Townes & Townes 1981) anticipated a new species from that area. However, the re-examination of that and other specimens has confirmed the presence of only one species in the region. The accumulated material prompts a redescription of the male and the first description of a female of *A. bicornis* (Figs 1–4).

MATERIAL AND METHODS

One male and four females were studied. Since the species was adequately described by Masner (1961) and subsequently re-diagnosed by Townes (Townes & Townes 1981), and the holotype is partly damaged, there has been no need to re-examine the type specimen to confirm the identity of the species.

Morphology was studied using light microscopy and environmental scanning electron microscopy (ESEM) with a maximum magnification of 2000×. Before mounting the South African female specimen from alcohol, it was cleaned in a weak solution of bioactive liquid detergent, then rinsed in water, placed in 70% and 96% ethanol for dehydration and cleaning, then transferred into a vial with hexamethyldisilazane (HMDS) for 30 minutes, and finally placed on a glass plate for drying and setting.

Pictures of the general appearance and details of the body structures were taken with Canon Powershot S50 camera, using PSRemote software. The captured images were assembled with Helicon Focus 4.16 software and edited in Helicon Filter 4.7 and Adobe Photoshop CS2.

The following acronyms are used: BMNH – Natural History Museum, London, UK; CASC – Californian Academy of Sciences, San Francisco, USA; CNCI – Canadian National Collection of Insects, Ottawa, Canada; NMSA – Natal Museum, Pietermaritzburg, South Africa.

TAXONOMY

Subfamily Proctotrupinae Kozlov, 1970

Tribe Cryptoserphini Kozlov, 1970

Genus *Afroserphus* Masner, 1961

Afroserphus: Masner 1961: 37; Townes & Townes 1981: 60; Johnson 1992: 279 (catalogue).

Type species: *Afroserphus bicornis* Masner, by original designation.

Diagnosis:

Body stout. Head broad, transverse (Fig. 5). Eyes bare. Frons with short prominent triangular horns above antennal insertion. Central part of frons bare and shiny. Mandible elongate, slightly curved, with single point. Maxillary palpus short. Male flagellum without noticeable tyloids. Notaulus absent. Collar in form of high ridge. Anterodorsal part of lateral aspect of pronotum obliquely wrinkled. Mesoscutum distinctly elongated, showing remarkable deep dense thimble-like punctures, and with anterolateral punctato-rugose area in position of notaulus. Epomia present. Scutellar pit with longitudinal carinae. Scutellum large, entirely rugose, bordered with keel, with broad smoothed hollow dorsally. Horizontal mesopleural groove complete. Middle basitarsus longer than hind basitarsus. All tarsal claws with 4 parallel-sided blunt teeth (Fig. 6). Stigma deep, almost as deep as wide, subcircular; vertical part of radius curved backwards at 90°. Medio-cubital cross (medial sclerite; Naumann & Masner 1985) well-developed as oval sclerite at forewing base. Abdomen without distinct stalk (Fig. 9). Syntergite with distinct traces of fusion of tergites 2–5, its margins not overlapping and leaving synsternite widely open. Ovipositor sheath broad and short (Fig. 10).

Afroserphus bicornis Masner, 1961

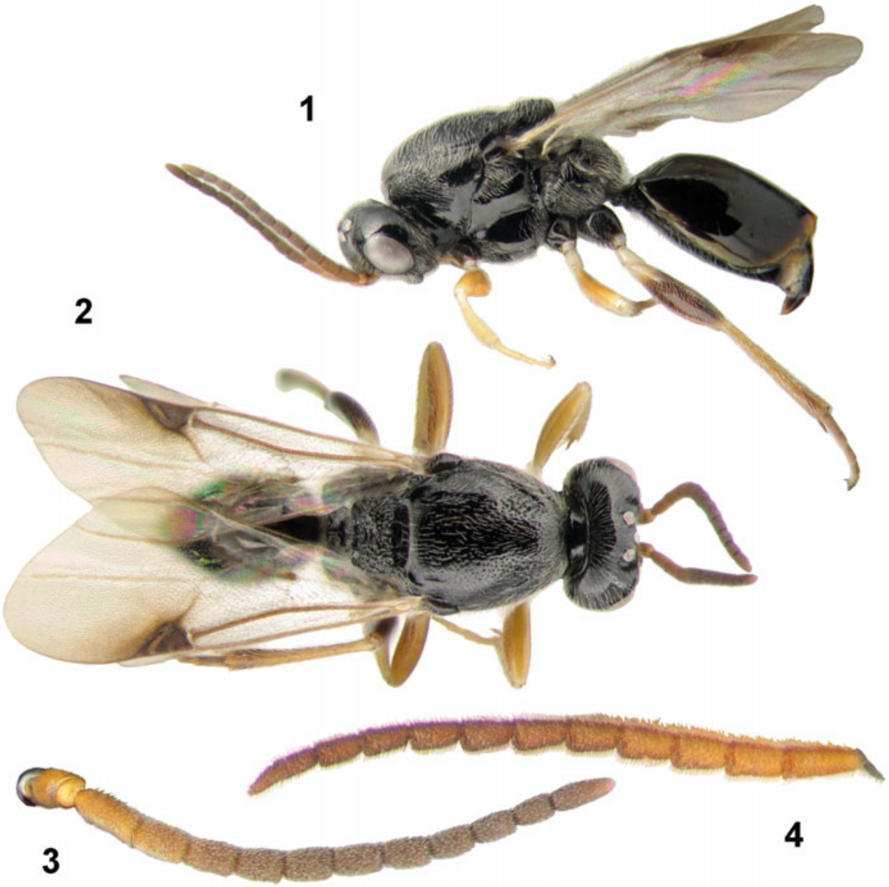
Figs 1–10

Afroserphus bicornis: Masner 1961: 39, figs 1–3; Townes & Townes 1981: 61, figs 9, 33; Johnson 1992: 279 (catalogue).

Description:

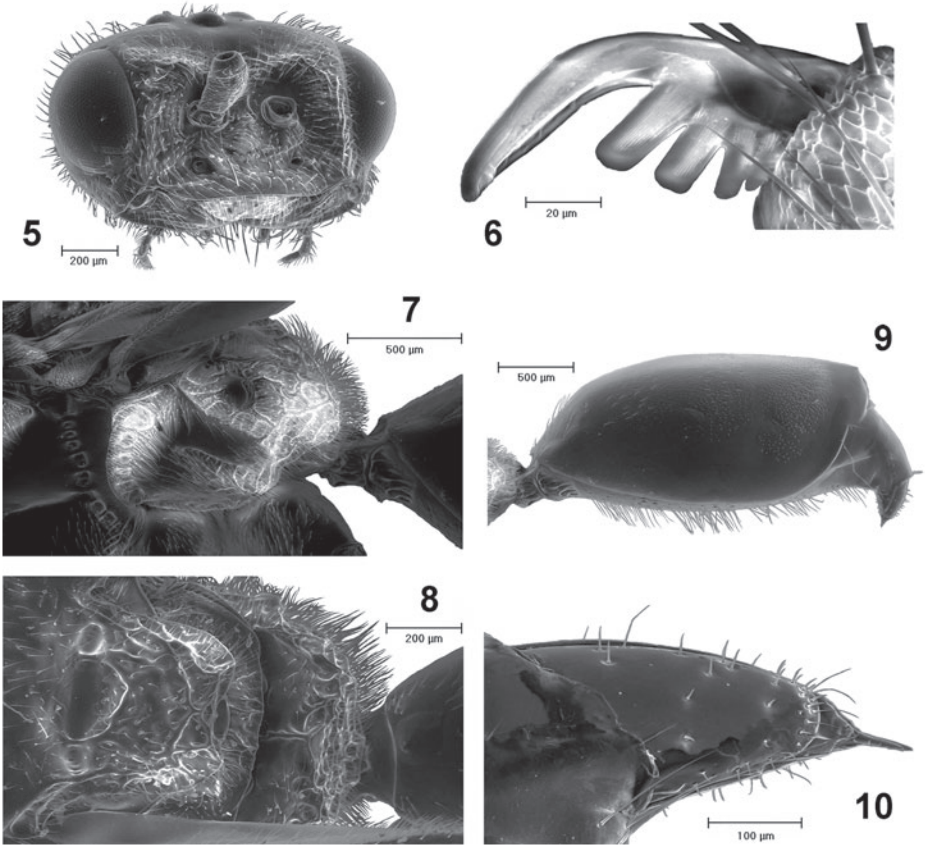
Male.

Forewing about 3.2–5.3 mm long. Prominent part of frontal horn along its inner side approximately as long as scape. Apart from central part of frons, face including horn, clypeus and labrum roughly and irregularly reticulated throughout. Frons between horns only with feeble trace of keel. Antennal flagellum rather thickened owing to trapezoid shape of flagellomeres (Fig. 4). Tyloids not forming specialised structure, but flagellomeres ventrally bear dense granulose sculpture. Ratios of antennomere lengths to widths: 2.1:1, 1.6:1, 2.5:1, 1.8:1, 1.6:1, 1.6:1, 1.8:1, 1.8:1, 1.8:1, 1.9:1, 2.0:1, 2.2:1, 4:1. Clypeus



Figs 1–4. General appearance of *Afroserphus bicornis*, light microscopy: (1, 2) female in lateral and dorsal aspects, (3, 4) female and male antennae.

very wide and short, its apex broadly truncate. Cheek very short, with developed malar sulcus. Temple strongly convex. Occipital carina absent from approximately lower third of head. Upper part of lateral aspect of pronotum strongly convex. Hair area on front edge of mesopleurum interrupted. Horizontal mesopleural groove posteriorly deep with smoothed margins, anteriorly shallow and slightly down-slanted. Mesopleural suture foveate. Middle tibial spur long and curved, almost as long as middle basitarsus (0.8×), noticeably longer than straight hind tibial spur that almost as long as hind basitarsus (0.8×). Propodeum short, strongly coarsely rugose, dorsally with 2 small smooth areas; entire propodeum covered with dense and long hairs. Costal side of radial cell about a third as long as depth of stigma. Upper third of forewing, including pterostigma, darkened. Base of syntergite broad, without longitudinal grooves. First part of thyridia slit-like and poorly discernible. Dorsal surface of syntergite densely punctate backwardly. Lower marging of syntergite bare. Entire synsternite densely and coarsely punctate and evenly covered with uniform long hairs. Body black, shining; antennae dull yellow-brown, darkened toward apex; coxae black; trochanters and basal



Figs 5–10. Details of body structures of *Afroserphus bicornis* female, ESEM: (5) head with small frontal horns above antennal pits, (6) fore-tarsal claw, (7, 8) propodeum in lateral and dorsal aspects, (9) abdomen laterally, (10) ovipositor.

parts of femora of all legs white; hind legs light to dark brown, other legs entirely yellow.

Female.

Similar to male, except for the following characteristics:

Prominent part of frontal horn noticeably shallower and almost half as long as scape. Antennal flagellum cylindrical (Fig. 3), antennomeres of usual shape, ratios of their lengths to widths: 2.0:1, 1.6:1, 2.0:1, 1.6:1, 1.6:1, 1.6:1, 1.6:1, 1.6:1, 1.8:1, 1.8:1, 1.9:1, 1.7:1, 3.0:1. Ovipositor sheath broad and short, 0.4 times as long as hind tibia, apically rounded, with rare punctures and short hairs.

Note: Different shapes of frontal horns in males and females suggest sexual dimorphism in this important generic character.

Material examined: SOUTH AFRICA: *Gauteng*: 1♀ Roodeplaat, ARC Exp. Farm, 25°36'23.54"S: 28°21'10.27"E, 1200 m, 6–21.i.2006, Malaise trap, L.B. Vilhelmsen & J. Pedersen (NMSA). UGANDA: 2♀ Kawanda, T. 485, 7.ii.1939, H.C. Taylor (BMNH); 1♀ Entebbe env., 3780 ft, 15–27.x.1971, H. Falke (CNCI). ZAMBIA: 1♂ Mbala, Abercorn, 5400 ft, 1.ii.1970, M.E. Irwin & E.S. Ross (CASC).

Biology: Unknown. The broad and short ovipositor sheath suggests a coleopteran host.

DISCUSSION

Afroserphus is closest to the monobasic genus *Serphonostus* Townes, 1981, which is known from Tasmania. *Serphonostus* possesses a similar combination of reticulation in the lower part of the face with a shiny and bare frons—characters that are rare in other proctotrupids. Most importantly, it bears vertical reticulated elevations next to the inner margins of the eyes; these structures are particularly noticeable in males and poorly expressed in females. Additionally, *Serphonostus* carries an evident projection with three pits along its upper edge in the centre of the upper part of the face. Thus, both *Afroserphus* and *Serphonostus* have projections on the face, which are not found in other genera in the family. In addition, both genera have a sclerotised medio-cubital cross (medial sclerite; Naumann & Masner 1985) at the base of the forewing and a darkened area around the pterostigma. *Afroserphus* differs in the absence of the notauli (they are well-developed and reach the scutellar pit in *Serphonostus*) and in having a broad and short ovipositor sheath, which is slender and rod-like in *Serphonostus*.

In our opinion, *Afroserphus* should be included in a group of genera— *Serphonostus*, *Sminthoserphus* Townes, 1981, and *Notoserphus* Townes, 1981—united by their presumed Gondwanan origin. *Afroserphus* demonstrates a unique combination of plesiomorphies (scutellar pit with longitudinal carinae, tarsal claws of all legs with toothcombs, well-developed medio-cubital cross, traces of fusion of tergites 2–5 into syntergite clearly visible, syntergite margins not overlapping) and apomorphies (frontal horns, absent notauli, collar in form of high ridge, middle basitarsus longer than hind basitarsus) that make it distinctive among closely related genera. Such a combination of characters could have been developed during a long persistence of this genus in Africa after the separation of this continent from the rest of Gondwana during the Early Cretaceous.

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